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ROMANCE OF MOTION

ALEC LEE

184. e.
26.

A SKETCH

ROMANCE OF MOTION

OR

A MODE OF MOTION

OF THE

PLANETARY BODIES IN SPACE.

ALSO A

HYPOTHETICAL ANALYSIS AND SYNTHESIS OF NITROGEN.

BY

ALEC LEE.

BIBLIOTHECA · BODLEIANA ·

LONDON:
LONGMANS, GREEN, AND CO.
1871.

184. e. 26.

'Before their eyes in sudden view appear
The secrets of the hoary deep; a dark
Illimitable ocean, without bound,
Without dimension; where length, breadth, and height,
And time, and place, are lost; where eldest Night
And Chaos, ancestors of Nature, hold
Eternal anarchy, amidst the noise
Of endless wars, and by confusion stand.
For Hot, Cold, Moist, and Dry, four champions fierce,
Strive here for mastery, and to battle bring
Their embryon atoms; they around the flag
Of each his faction, in their several clans,
Light armed or heavy, sharp, smooth, swift, or slow,
Swarm populous, unnumbered as the sands
Of Barca or Cyrene's torrid soil,
Levied to side with warring winds, and poise
Their lighter wings. To whom these most adhere,
He rules a moment: Chaos umpire sits,
And by decision more embroils the fray,
By which he reigns: next him high arbiter
Chance governs all. Into this wild abyss,
The womb of Nature, and perhaps her grave,
Of neither sea, nor shore, nor air, nor fire,
But all these in their pregnant causes mixed
Confusedly, and which thus must ever fight,
Unless the Almighty Maker them ordain
His dark materials to create new worlds.'

PARADISE LOST.

PREFACE.

IN THE COURSE of a perusal of some of the scientific works of the day, it has frequently occurred to the author that some of the explanations of the phenomena of nature were not wholly sufficient, and that though they contained much of the truth they did not embrace the whole truth, and also that more accurate as well as more extended conceptions of their real causes might be attained were some alterations made on the hypotheses on which these explanations rest. With this idea he jotted down from time to time such facts or effects as seemed to converge from various directions on certain points, sought out the laws and conditions under which these effects might be rendered possible, assumed these conditions as hypotheses, and then proceeded to trace out a few other effects consequent upon their adoption. How far these hypotheses are altered in the right direction, and how far the inferences are correctly drawn, he leaves to time and circumstance to decide.

The opening remarks of the paper on Motion are designed to show that the position presently held by Astronomy with regard to the motions and velocities of the planetary bodies is not unassailable, and the other portions are devoted to the consideration of their peculiarities on the hypothesis that the ether in space is a material substance, and that the various world systems are upheld by the continued operation of a duality of forces, and not, as heretofore alleged, by one well-directed primal impulse, acting in combination with the one continuous force of gravitation.

The hypothetical analyses and syntheses of nitrogen are carried out on the same principles. Were this subject reasoned out a little further than appears in the context, the oceans of the air and the water might be found to be the two great reservoirs of the organic matter of our planet; that in their decomposition and recomposition with the bases of the earth animal and vegetable organisms, under the guidance of Supreme Power, spring into existence and development, and that the material part of these organisms are reconvertible by a process of combustion into mother air, earth, and water on passing through the intermediate stage of carbonic acid, vapour, and ash.

Should the principle of this analysis prove correct, we may come to a better appreciation of the elements of the ancients on the one hand, and on the other to the consciousness of the possibility of such further reduction of our simple bodies as must ultimately point to a common origin for all things.

A. L.

Bankfield,
March 1st, 1871.

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A SKETCH

ROMANCE OF MOTION.

As years roll on and the worlds assume new combinations in the grand kaleidoscope of the heavens, some new "writer of books," commenting on the peculiarities of the science and philosophy of the nineteenth century, will be able to relate how at that period of the world's progress the perpetual motion of the heavenly bodies was currently regarded as proceeding from primal impulse, and how at the same time the like principle of motion was considered as inapplicable to all combinations of their constituent parts. He will also be able to state how the planets were supposed to roll through the medium in space without let or hindrance, as through some non-resisting spiritual essence; and how the atoms of the same medium vibrated at the touch of light and heat, as if it possessed all the resisting and conducting properties of a material substance. Again, how all bodies were supposed to persevere in their state of rest or of motion in a straight line, unless compelled to change that state of rest or of motion by the impression of force on them; and how, in opposition to this law, the planets became accelerated and retarded in their orbits without such adequate impression of force. Also, how bodies initially projected at the surface of the earth fell by the force of gravitation with velocities uniformly accelerated, and how the planets, similarly projected, descended towards the sun with velocities comparatively equal throughout the entire duration of their revolutions. And, not to multiply instances, how the men of science, on the one hand, gravely held that the heavenly bodies were maintained in the true paths by the errors and irregularities into which they led each other, and, on the other, how the ecclesiastics authoritatively urged that all bodies, celestial and terrestrial, to be thus happily maintained, must come under the guiding and directing operations of powerful central influences.

Now, as it is inconvenient when matters of science tend in opposite directions, we shall approach this subject of the motion of bodies in space from another point, and make an endeavour towards bringing the more salient of their peculiarities within the scope of some laws of nature already established. With this purpose let us pave the way by assuming, rightly or wrongly as the case may be, that the medium in space is really a material substance, resistant alike to the passage of planetary bodies and of light and heat, and as a consequence that the continued tangential velocities of the heavenly bodies flow from the impact of continuous tangential forces. On the basis of this combination of hypotheses, together with the effects of the force of gravitation, we shall seek to adduce the method of the free motion of the planets in space, the reasons for their accelerations and retardations in their elliptic orbits, the probable nature of the forces by which they are impelled, and the relations that they variously bear to each other.

In illustration of the first of these problems, let us suppose a ball to be horizontally projected at, or rather a little above the earth's surface, and that the velocity arising from its propulsion be so nicely arranged with the strength of the force of gravitation that at the end of a unit of time the ball be brought, in accordance with the law of the parallelogram of forces, to occupy a position equidistant from the earth's centre as the point from which it was projected. Let this velocity be maintained from the new point by a fresh tangential impulse, and the force of gravitation be similarly brought to bear upon it, and at the end of the next unit the ball will again be found at an equidistant position from the earth's centre. Let another impulse, and so on. It becomes evident that if these impulses be sufficiently continued the ball will make the circuit of the earth in mid-air, and that a permanent application of the two forces on these principles will extend its motion to an enduring series of revolutions. Further, were the impulses to be communicated to the ball in an infinitely short space of time, its motion would leave the angular and assume the curvilinear form of an orbit. Let now the ball be supposed to be so indifferently circular and homogeneous as to have a heavy side; this side will lead through the resisting atmosphere in the direction of the diagonal of the two forces by which it is impressed, and in the course of a revolution the ball will turn on its own axis and present at every point the same face towards the earth. It need hardly be remarked that this is virtually the polite behaviour of our attending man in the moon, and that the other satellites preserve the same respectful attitudes towards their primaries.

When we turn from the general mode of motion of the bodies in the heavens under the supposed action of two forces to the examination of their individual movements, we find that each planet, as it revolves round the sun, moves in an elliptic orbit, describes equal areas in equal times, and proceeds with a velocity at every point varying inversely as the perpendicular on the tangent. With these premises it can be shown that if the planet moves in a resisting medium, the force of propulsion varies inversely as the squares of the perpendiculars on the tangents. General readers must kindly pardon the introduction of a few dry-looking symbols to be presently used for the purposes of demonstration.

$$\begin{array}{lccccccc} \text{given} & p & : & p' & :: & v' & : & v \\ \therefore & p^2 & : & p'^2 & :: & v'^2 & : & v^2 \end{array}$$

and when bodies move in a resisting medium—

$$\begin{array}{lccccccccccc} & & & f & : & f' & :: & v^2 & : & v'^2 \\ & & \therefore & f & \underline{:} & \underline{f'} & \underline{::} & \underline{p'^2} & \underline{:} & p^2 \\ \text{and if } f & : & f' & :: & v^2 & : & v'^2 \\ \therefore \sqrt{f} & : & \sqrt{f'} & :: & v & : & v' & :: & p' & : & p \end{array}$$

Consequently the velocities of the planets become accelerated or diminished in their orbits in the subduplicate ratio of the forces by which they are impressed.

But how comes it that the force of propulsion of each planet in its orbit varies inversely as the squares of the perpendiculars on the tangents and not as the inverse squares of the actual distances, and what is the nature of the forces by which these bodies are impelled? The favourite experiment of fusing a diamagnetic substance, and the general behaviour of a magne-crystallic body in the magnetic field seem to throw some light on this important subject. The heat evolved in the former body is evidently due to the tangential resistance of the magnetic action, for when the body is resting quietly on its pivot, or when it is put in motion with the current suspended, no heat nor resistance beyond the small quantity allowable in ordinary circumstances for friction is produced. But when the magnetic action is brought into play resistance with the accompanying heat is instantly experienced in the direction of the motion of the diamagnet, which direction is ultimately tangential. Take now the converse of this experiment, and suppose the diamagnetic substance to become a circular revolving magnet throwing out its energy in all directions, and the magnet to become a fixed diamagnetic substance, with an equal expenditure of force, the same amount of heat will be evolved in the diamagnet as before. Let the latter body be now unfixed, and allow the heat to be converted into motion in a tangential direction, rein the body into proper position with regard to the centre by a force operating like gravitation, and, as has been shown in the first of these propositions, the necessary elements are obtained for causing the body to effect a series of revolutions. In this manner, if the sun can be ascertained to be an immense magnetic engine, sending forth its energy into space in all directions, and the planets be proved to be endowed with diamagnetic virtues, a theory for the reason of the continuous nature of their revolutions may come to be established, and magnetism be magnified into the greatest of the universal forces.

Further, when bodies possessing the compound properties of magne-crystals are placed in the magnetic field, a force is developed which causes them to take up certain positions with respect to the poles, at which they remain in equilibrium. This class of bodies also possesses the power of reacting on the magnet with a force varying according to certain laws with the distance of their removal from the position of equilibrium. When these matters are considered in conjunction with the eccentricities and inclinations of the orbits of the planets, and these bodies be supposed to be endowed with the compound virtues of magne-crystals, a probable clue to the reason begins to appear why the velocity of each, in the course of its revolution round the sun, varies as the perpendicular on the tangent instead of the actual distance. In elliptic orbits the perpendiculars on the tangents and the actual distances coincide at the perihelion and aphelion. Let these be considered the positions of equilibrium, and that the magnetic propelling action of the sun on a planet varies throughout its orbit inversely as the square of the distance, and that the reacting power of the magne-crystallic planet varies directly as the square of the tangent to the perpendicular, then—

$$f \propto \frac{1}{d^2}$$

$$d^2 \propto p^2 + \tan^2$$

$$\therefore d^2 - \tan^2 \propto p^2$$

but when d^2 varies inversely as the forward force of the sun on the planet, and $\tan^2$ varies directly as the counter force of the planet to the sun's action, then difference of forces $\propto \frac{1}{d^2 - \tan^2} \propto v^2$ through a resisting medium

$$\therefore v^2 \propto \frac{1}{p^2}$$

$$\therefore v \propto \frac{1}{p}$$

And conversely, when a body is retained in position by the force of gravitation, and is impelled tangentially through a resisting medium by a force varying inversely as the square of its distance from the sun, and is retarded by another force varying as the square of the tangent to the perpendicular from the focus, the body will revolve in an elliptic orbit, will describe equal areas in equal times, and the eccentricity of the orbit will equal the tangent on the perpendicular at the mean distance. In accordance with the terms of this proposition, it is interesting to note that if a body were to exist with an inferior mass, but were endowed with counter magnetic action superior to the forward impelling force of the sun, the body might be expected to revolve, like Halley's comet, round the sun in the reverse direction.

The probable existence of a relation in the nature of the various planets comes into view when the liberty is taken of supposing these bodies replaced in the heavens at distances in certain ratios to their actual distances. When this supposition is followed out several of the coincidences and peculiarities of orbital motion present themselves in slightly different forms. The first of these propositions may be enunciated thus. Were the distance of the various planets from the sun altered in the ratio of their subduplicate distances to their actual distances, and it were then possible for them to revolve with their present velocities, these bodies would all describe equal areas in equal times. Let D′ equal the distance of d' altered in accordance with this ratio.

$$v : v' :: \sqrt{d'} : \sqrt{d} :: d' : D' :: D' : d$$

$$\therefore \text{area } v\, d = \text{area } v'\, D'$$

Second. When the rule of the velocities varying inversely as the altered distance is brought into operation, the more important fact comes to the surface that at the distances in the ratio of the square roots of the distances to the actual distances, the planets would all revolve with equal velocities; and also that the areas described by each in a given time would be the same as the areas described by them at their present distances and velocities. Let V′ D′ represent the altered velocity and distance of v' d'

$$\sqrt{d'} : \sqrt{d} :: d' : D'$$
$$d' : D' :: V' : v'$$
$$\therefore \sqrt{d'} : \sqrt{d} :: V' : v' :: v : v'$$
$$\therefore V' = v$$

and their areas in a given time would equal their present areas; for

$$d' : D' :: V' : v'$$
$$\therefore \text{area } d'\,v' = \text{area } D'\,V'$$

This distance of equal velocity may be termed the distance of equal magnetisation, or the distance of equal force of projection; for when

$$V' = v$$
$$V'^2 = v^2 = \text{the force of projection though a resisting medium.}$$

And conversely the distances in the ratio of the square roots of the distances to the actual distances of the planets, taken in connection with the eccentricities of their orbits, furnish the scale of their diamagnetic and magne-crystallic virtues and composition.

Were it possible for the planets to revolve at these distances of equal magnetisation with equal velocities, their periods would be in the simple ratio of the distances; as, however, the law of free revolving bodies requires the velocities to be in the inverse subduplicate ratio of the distances, the planets on their formation in the regions of space must either fall forwards or be projected outwards to these positions of equilibrium between the forces, according as the force in the centripetal or tangential direction happens at the place to be in the ascendant. At these positions of equilibrium, or in other words at their actual distances, the periods of the planets necessarily become as the products of the distances and their subduplicates, or as the equation is more commonly rendered, the periods square become as the distances cube. Now, on account of the planets occupying these positions of equilibrium between the two forces, and by reason of the motions arising from their impact varying in different ratios with respect to the varying distances, it becomes evident that though a disturbance or withdrawal from the natural positions of the planets takes place from their mutual influences on their approach to each other, the sun must nevertheless possess the power of restoring them to their proper distances as the disturbing influences become weakened by increasing separation. This power of restoration, so long as it lasts, cannot fail to prove an immense guarantee for the continued stability of the solar system.

When the ether in space is regarded as a material substance and subject to numerous chemical changes and combinations, does it seem so passing strange that under the influences of the light and heat that traverse it in all directions from a great variety of sources condensations should from time to time take place, and give rise to huge seas of dimly perceptible matter, or that the nebulæ thus formed should proceed to take form and substance under repeated applications of the same force, and appear as comets coming to the centres of light and heat, there to be exposed for a short period to a process of expansion, moulding, and preparation for renewed concentration on their return to the cold distant regions of their nativity? Or, is it beyond possibility that these wayward things, after having passed through many phases and assumed many conditions, should at length become formally attached to individual systems, take up distinct places within their bounds, and settle down into steady-going decorous planets, furnished and endowed with all the capabilities for supporting new existences called into being by the breath of life from the dust of the ground?

In conclusion, as the satellites proceeding in double revolution round the sun and planets become typical of the great sun with its attendant train of orbs, being borne along with other systems by the power of some greater luminary in the far distance—planet, sun, and system occupying positions of arrangement relatively to each other by virtue of the nature and circumstances of their construction, and moving in their several spheres with the truest accuracy and precision. So these again typify orbs of greater and greater power, and system upon system revolving and singing the hymn of praise in grander and yet grander revolution, till Heaven itself broadens out into the boundless universe, and man loves to fancy that as science advances in knowledge along the great chain of causation, its responses will approach nearer and nearer to the teachings of revealed religion, and finally attain its full fruition in the perfect light of that Infinite One, from whom proceeds all the energy, beauty, and order by which the worlds are created and governed.

PART II.

HYPOTHETICAL ANALYSIS AND SYNTHESIS OF NITROGEN.

HYPOTHETICAL DECOMPOSITION AND RECOMPOSITION OF ATMOSPHERIC AIR IN THE PROCESS OF RESPIRATION.

HYPOTHETICAL ANALYSIS
AND SYNTHESIS OF NITROGEN.

Chemical equivalent and specific gravity of Nitrogen = 14.

Name of Substance	Formula of Analysis	Atomic Vol. of Gases	Atomic Weight	Atomic Vol. of Gases after Combination	Specific Gravity
Nitrogen . .	Ȼ_3	3	36		
	H_4	4	4		
	Ɵ	1	16		
		8	56	4	14

As this analysis of nitrogen contains the elements of carbonic oxide and olefiant gas, for $\text{Ȼ}_3\ \text{H}_4\ \text{Ɵ} = \text{Ȼ}\,\text{Ɵ} + \text{Ȼ}_2\ \text{H}_4$, let us take these substances and suppose them to be united in nitrogen in accordance with chemical laws by a double process of combination, thus:—

Name of Substance	Formula	Atomic Vol. of Gases	Atomic Weight	Atomic Vol. after Combination	Specific Gravity
Carbonic Oxide .	Ȼ	1	12		
	Ɵ	1	16		
		2	28	2	14
Olefiant Gas . .	Ȼ_2	2	24		
	H_4	4	4		
		6	28	2	14
Carbonic Oxide .	$\text{Ȼ}\ \text{Ɵ}$	2	28		
Olefiant Gas . .	$\text{Ȼ}_2\ \text{H}_4$	2	28		
		4	56	4	14

On the same principles cyanogen shows itself to be a progressive combination, richer in carbon than nitrogen. It is known to be a compound of $Ꞓ + N = 4\ Ꞓ + 4\ N$, and to have a gas specific gravity of 26.

Adding 4 Ꞓ to the components of 4 N, cyanogen equals $Ꞓ_7\ H_4\ Θ$, probably united in the following manner:—

Name of Substance	Formula	Atomic Vol. of Gases	Atomic Weight	Atomic Vol. after Combination	Specific Gravity
Carbonic Oxide .	$Ꞓ$	1	12		
	$Θ$	1	16		
		2	28	2	14
New Compound .	$Ꞓ_6$	6	72		
	H_4	4	4		
		10	76	2	38
Carbonic Oxide .	$ꞒΘ$	2	28		
New Compound .	$Ꞓ_6 H_4$	2	76		
		4	104	4	26

Hypothetical decomposition of nitrogen in respiration, and its recomposition with the free oxygen of the atmosphere.

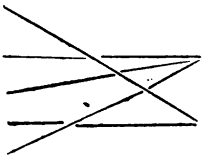
Name of Substance	Formula of Analysis	Atomic Weight	Atomic Vol. after Combination	Specific Gravity
4 Vol. Nitrogen . .	$Ꞓ_3\ H_4\ Θ$	56	4	14

Atmospheric air contains 4 vol. nitrogen and 1 vol. oxygen, in a state of admixture, which put in the analysis form is as follows :—

Name of Substance	Formula of Analysis	Atomic Weight	Atomic Vol. on Admixture	Specific Gravity
Atmospheric Air . .	$\text{Ꞓ}_3\,\mathrm{H}_4\,\Theta$ Θ	56 16	4 1	
		72	5	14·4

In the process of respiration part of the nitrogen may be decomposed and become combined with the free oxygen of the atmosphere in the following manner.

The products are free nitrogen, carbonic acid, and vapour of water, thus :—

Name of Substance	Quantity decomposed	Formula of Analysis	Formula of Product	Name of Product	Atomic Vol. of Product
Nitrogen	4 vol.	Ꞓ^{3} H_4 Θ 	$2\ \mathrm{H}_2\,\Theta$	Vapour of Water	4
Oxygen .	7 vol.	Θ_6 Θ	$3\ \text{Ꞓ}\,\Theta_2$	Carbonic Anhydride	6
	11 vol.				10 vol.

This shows 11 vol. nitrogen and oxygen to be converted into 10 vol. carbonic anhydride and vapour of water, and as a consequence these products will derive an accession of heat.

But atmospheric air contains 4 vol. nitrogen for 1 vol. oxygen. Hence 28 vol. nitrogen must be inhaled to furnish 7 vol. oxygen, and the reduction of volume of the atmospheric air amounts only to one thirty-fifth.

$$\text{Atmospheric air inhaled} = \begin{cases} 28 \text{ vol. nitrogen} \\ 7 \text{ vol. oxygen} \end{cases}$$

$$\overline{35 \text{ vol.}}$$

$$\text{Exhaled products of atmospheric air} = \begin{cases} 24 \text{ vol. nitrogen} \\ 4 \text{ vol. vapour of water} \\ 6 \text{ vol. carbonic anhydride} \end{cases}$$

$$\overline{34 \text{ vol.}}$$

The quantity of nitrogen entering into combination with the free oxygen of the atmosphere in the process of respiration is in the ratio of one to two by weight.

4 vol. nitrogen = 56 atomic weight = 1
7 „ oxygen = 112 „ „ = 2

This combination of 4 vol. nitrogen with 7 vol. oxygen gives water and carbonic anhydride in the ratio of 3 to 11 by weight.

4 vol. water = 36 atomic weight = 3
6 „ carbonic anhydride = 132 „ „ = 11

On these analyses and syntheses theories might be founded to account for—

The non-cooling of the blood in the process of respiration.

The exhaling of large quantities of carbonic acid and water without exhaustion and desiccation of the system.

The sustenance of animals in the lethargic or dormant state.

The sustenance and development of vegetable matter.

The value and properties of nitrates as manurial agents in the cultivation of the soil, &c. &c.

LONDON: PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET